VII. *Remarks upon a ſuppoſed Demonſtration, that the moving Forces of the ſame Body are not as the Velocities, but as the Squares of the Velocities. By the ſame.*

THE Demonſtration runs thus: "Concipio corpus
"C *Fig.* 7. moveri obliquè in elaſtrum L, velocitate
"CL ut 2, angulo inclinationis CLP exiſtente
"30 gr. cujus nempe ſinus CP eſt ſemiſſis radii CL.
"Suppono autem eam eſſe reſiſtentiam in elaſtro, ut
"ad illud tendendum requiratur præciſè unus velocitatis
"gradus in illo corpore, ſi perpendiculariter impingeret.
"Quid ergo jam fiet poſt incurſionem obliquam
"corporis C in elaſtrum L? Quoniam motus
"per CL componitur, ut notum eſt, ex duobus collateralibus
"per CP & PL, & cum CP, ſecundum
"quam corpus directè impingit in elaſtrum L, exprimit
"dimidiam celeritatem corporis per CL, conſumetur
"hic motus per CP, tenſo elaſtro (perinde enim eſſet,
"ac ſi corpus C celeritate CP perpendiculariter
"incurreret in elaſtrum, quod per Hypotheſin, eam
"celeritatem deſtruere poſſet) remanente corporis celeritate,
"& directione PL. Producta igitur PL in
"M, ita ut LM ſit $= PL = \sqrt{3}$ (ponitur enim CL
"$= 2$) & applicato in M alio ſimili elaſtro faciente
"cum LM angulum LMQ, cujus ſinus $LQ = CP = 1$,
"per eandem rationem manifeſtum eſt corpus C,
"poſt tenſionem elaſtri L, tenſurum eſſe elaſtrum M,
"amiſſo motu per LQ, & ſervato motu per QM.
"Prolongata itaque QM ad N, ut fiat $MN = QM$

=

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“ $=\sqrt{2}$ ibique ſubſtituto elaſtro ſimili tertio conſtituente cum MN angulum MNR ſemirectum, quo ſcilicet MR iterum ſit $=CP=1$; patet ſimiliter motum per MR totum impendi in tenſionem elaſtri N, corpore interim moveri pergente directione & celeritate $RN=1$. Denique ſi hac celeritate reſidua impingat perpendiculariter in elaſtrum O, huic tendendo totam ſuam vim reliquam dabit; ipſum itaque corpus ad quietem redigetur. Hiſce ita præmiſſis, patet nunc potentiam corporis C tantam fuiſſe, ut per ſe ſolum tendere poſſit præciſè quatuor elaſtra talia, ad quæ ſingula ſeorſim tendenda requiritur dimidia velocitas corporis æqualis ipſi C, adeóque cum effectus illius quadruplo major ſit quàm effectus hujus, evidens eſt quoque vim corporis velocitate 2 grad. quadruplam eſſe vis corporis ejuſdem, vel æqualis, velocitate 1 grad.

“ Haud abſimili modo demonſtrarem corpus C velocitate 3 grad tendere poſſe 9 elaſtra, ad quorum unum tendendum unus velocitatis gradus in eo corpore requiritur, & tandem in genere numerum elaſtrorum tenſorum ſemper eſſe quadratum numeri graduum velocitatis. Unde igitur ſequetur, vires corporum æqualium eſſe in duplicata ratione celeritatum. Q. E. D.

1. This Argument is founded entirely on the commonly received Doctrine of the Compoſition and Reſolution of Forces, and not upon any deciſive Experiments, that have been actually made upon this occaſion.

2. All that is proved from this Doctrine, is, that a Body moving with two Degrees of Velocity, may be made to bend 4; with 3 Degrees of Velocity it may be made to bend 9 ſimilar Springs, each deſtroying one Degree

Degree of Velocity in a perpendicular Direction, before its force is entirely ſpent, provided you take care to alter the Directions of the Motion in every Stroke but the laſt, after a certain manner: That had the ſame Body moved but with one degree of Velocity in one Direction, and that in a perpendicular one, it would have loſt all its force at once, and bent but one of thoſe Springs: Which is far from proving the thing in Queſtion.

3. To make the Reaſoning on this Head concluſive, the two Bodies ſhould not only be equal in Quantity of Matter, but alike in that material Circumſtance the Direction of their Motions; ſo that if one of the Bodies move in a perpendicular Direction, the other ſhould do ſo too; or if the one ſtrikes in an oblique Direction, the other ſhould do the ſame, and that in the ſame degree of Obliquity; and laſtly, if one moves in ſeveral Directions, the other ſhould do the ſame. But in the caſe before us one is ſuppoſed to move but in one Direction perpendicularly, and the other to move in three oblique Directions, and but one perpendicular.

4. Let therefore the ſame Body move always in the ſame Directions, and with a ſmall Alteration, the Argument uſed in this Demonſtration will be ſo far from proving that ſide only of the Queſtion for which it was brought, that it will equally ſerve to prove the truth of the other, namely, that the Forces of the ſame Body moving with different Velocities are as thoſe Velocities.

Let therefore the ſame Body, inſtead of moving with two Degrees of Velocity, move but with one, and in the ſame Directions as above; only let the Springs be capable of deſtroying but half a Degree of Velocity in a perpendicular Direction; then by the ſame ſteps of reaſoning it will follow, that this Body will now alſo bend 4 ſimilar Springs, before its Force is ſpent; ſo that the ſame Body moving with half the Velocities, and in the ſame Directions as before, bends the ſame number of Springs; only now the Springs make but half the Reſiſtance, that the Springs in the former caſe made; therefore the Effect in this caſe, according to our way of eſtimating an Effect, is but half the former Effect; conſequently the Forces producing theſe Effects are as 2 to 1; But in this *Ratio* are the Velocities, with which the Body moved in the two Caſes; therefore the Forces are as the Velocities.

Let the Body move with 3 degrees of Velocity, and it will bend 9 ſimilar Springs each deſtroying one Degree of Velocity in a perpendicular Direction, before the whole Force is conſumed. So alſo by the ſame way of arguing, 'tis as certain, that if the ſame Body move with one degree of Velocity, it will bend 9 ſimilar Springs, each deſtroying a third part of one Degree of Velocity in a perpendicular Direction, before its Force is extinguiſhed: So that ſtill the Effects, or Reſiſtances overcome in the ſame Directions, are, according to our way of computing, as 3 to 1; and ſo alſo their Forces muſt be but in the ſame *Ratio* of 3 to 1, as were the Velocities; conſequently the Forces are as the Velocities.

5. Since therefore this Proof drawn from the Doctrine of Compoſition and Reſolution of Forces equally proves both ſides of the Queſtion, it proves too much, or in reality nothing at all; and is therefore far from deſerving the Name of a Demonſtration.

Fig. 1.

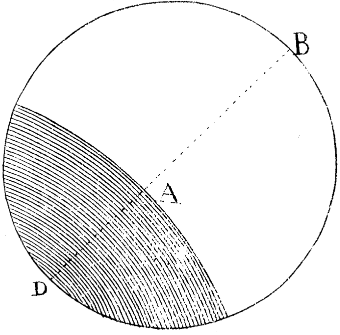

Fig. 2.

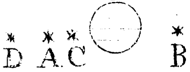

Fig. 3.

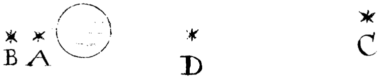

Fig. 5.

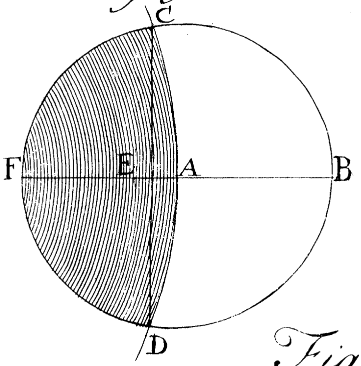

Fig. 4.

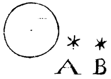

Fig. 6.

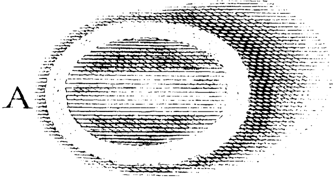

Fig. 7.